NATIONAL PARK SERVICE

Conserve O Gram

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Handling And Shipping Cellulose Nitrate Film

Cellulose nitrate motion picture and still photographic film self-destruct at an unpredictable rate over time unless stored at a very low temperature and appropriate relative humidity. Nitrate becomes acidic as it deteriorates and reacts with water in the air. These gases are deep lung irritants. Repeated exposure may cause eye irritation, rashes and sores on the face and skin, vertigo, nausea, headaches, swollen glands, and respiratory irritation.

Nitrate oxide gases from nitrate film also damage surrounding museum materials, causing embrittlement of paper and film and cumulative damage to many organic materials. Detriorated nitrate film is highly flammable and capable of burning under water. Nitrate fires are almost impossible to put out. Nitrate is not an appropriate material for placement in general museum, archival, library, or office storage. See *Conserve O Gram* 14/8, "Caring for Cellulose Nitrate Film," for further information.

Most collections of motion picture and still negative materials dating from the 1910s to the 1950s contain nitrate. The primary method of preserving nitrate is to duplicate the original image onto safety film. For guidance, see *Conserve O Grams* 19/10-19/13, which explain how to prioritize materials for reformatting, select a copy technology, contract for reformatting, and inspect the resulting duplicates.

Methods of Transport

The best method of transporting nitrate is to use the services of a courier in a temperature-controlled vehicle. Inform the courier of the hazards of transporting nitrates. The courier should avoid making any stops. If stops must be made, warn the courier not to park the vehicle and leave it in the sun for long periods. The courier also should not run the car heater excessively, as the heat buildup within might trigger a fire. If possible, move the film in the early or cool hours of the day. If a courier is not practical, you may use Federal Express (FedEx) to ship nitrate negatives (stills) and United Parcel Service (UPS) to ship motion picture film.

***NOTE:* Regulations on shipping flammable materials change from time to time. Check with your shipper to keep up-to-date with the proper labeling information.**

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Handling and Working with Nitrate	
DO...	***DON'T...***
set up a work area in a cool, well-ventilated space far from office areas and collections:	work in this space for more than 2-3 hours daily.
• gather necessary equipment, supplies, and tools before you begin. • plan how you will handle, pack, and ship nitrate before beginning.	wait until you are ready to ship the material to begin inventorying it, housing it, and packing it.
• obtain a fan if ventilation is not excellent in the workspace. • position the airflow from a large floor fan so that it blows directly on you and towards an air intake vent.	use an older or damaged fan. Ensure that the fan is in good condition with no electrical shorts that might cause a nitrate fire.
• wear vinyl or latex gloves and a long-sleeved, washable smock for protection when handling nitrate. • wash gloves with a mild soap and rinse thoroughly at the end of the day or each time you take them off. • wash smocks at least weekly.	• touch your eyes or skin with contaminated gloved hands. • reuse dirty and contaminated gloves.
wear a rated breathing apparatus, such as a respirator if you notice any breathing difficulties or build-up of odor in the workspace.	neglect to read *Conserve O Gram* 2/13, An Introduction to Respirator Use in Collections Management.
wear goggles if ventilation is poor or if your eyes are sensitive to nitrate fumes.	wear contact lenses while working with nitrate, as gases may concentrate and build up under your contacts causing eye injury and contact lens deterioration.
work on a surface that is either easily washable or use layers of clean non-printed newsprint paper that can be ripped off and disposed of at the end of the day.	forget to wash your work surface daily with a solution of one teaspoon baking soda to one pint of water to neutralize the acid from the nitrate.
maintain a log of who works with nitrate and when. Document any problems in the space including odors, discomfort, or ill effects noticed.	continue working with nitrate if you experience any health problems including breathing, skin, or eye problems. Stop immediately and contact the park safety officer and your doctor.
select which nitrates deserve duplication based upon: • your Scope of Collections statement • degree of deterioration • The value, use, and risk of the material (see *Conserve O Gram* 19/10)	• automatically reformat everything that is nitrate. Take the time to evaluate your collection. • attempt to ship or reformat nitrate that has a flowing (soft and slipping) or powdery image area. Instead, deaccession and dispose of these items as hazardous waste after talking with your regional/SO curator.

Packaging Nitrate Photographic Negatives (Stills)	
DO.....	***DON'T...***
• place each negative that you have selected for reformatting in a buffered (high calcium carbonate reserve) four-fold envelope labeled with captions and control numbers (buffering will help neutralize the acid). • place 100 negatives or fewer (about 2.2 pounds or 1 kg of nitrate) within a single small box. • place the small box within a larger box that has packing material within it. • wrap and label the boxes as described below.	• use plastic or unbuffered housing or sleeves for nitrate negatives. • wait until the negative is in the envelope to label it or you may damage the image. • use sleeves that require you to slide the image, as they may cause further damage if the emulsion is soft. • let your larger box get heavier than about 30kg (66 pounds).

Packaging Nitrate Motion Picture Film	
DO...	***DON'T...***
• place each roll of motion picture film inside a secure, uncorroded film can; add packing materials if the film does not fit snugly. • place film cans within a small fiberboard box that is then placed within a large box for shipping.	• forget to use ample cushioning materials in the larger box. • neglect to follow the labeling and wrapping descriptions described below.
• place about five motion picture reels in a small fiberboard shipping box. • place the small box inside a larger shipping box padded with newsprint paper. • place an extra mailing label inside the box. • seal the box carefully with fiber strapping tape.	• use standard Federal Express packaging. Packaging should be free of writing. • place more than 10 kg (22 pounds) of nitrate motion picture film within a box.

Labeling and Shipping Boxes of Nitrate

DO...	*DON'T...*
label the outside of the container as follows: FILM NITROCELLULOSE BASE 4.1 UN 1324 Y400 III LIMITED QUANTITY NAME AND ADDRESS OF SHIPPER NAME AND ADDRESS OF RECIPIENT	• forget to attach FLAMMABLE SOLID labels to one or more sides of the box • wrap labels around the side of the box
on the FedEx air bill: put an "X" in the "YES" box below "Does this shipment contain dangerous goods?"	
List each container sent separately on the lower half of the FedEx SHIPPER'S DECLARATION FOR DANGEROUS GOODS form as follows: ***Column Name*** — ***Text*** Proper Shipping Name — **Films/Nitrocellulose Base** Class or Division — **4.1** UN or ID No. — **UN 1324** Packing Group — III Subsidiary Risk — **n/a** Quantity & Type of Packing — **(1) Fiber Board Box x ____kg** Packing Inst. — **Y400** Authorization — **Ltd. Qty.**	neglect to do the following: • place the SHIPPER'S DECLARATION FOR DANGEROUS GOODS form with the airbill envelope attached to your container • where the form states THIS SHIPMENT IS WITHIN THE LIMITATIONS PRESCRIBED FOR cross out ~~CARGO AIRCRAFT ONLY~~ • where the form states SHIPMENT TYPE cross out ~~RADIOACTIVE~~ • sign and date the form • provide your telephone number
call the recipient to let them know when to expect the shipment. Keep a log documenting: • all nitrate shipped, dates received by reformatting agency, dates returned with duplicates • actions taken to inspect and rehouse the materials • ultimate disposition of the original nitrate after the duplicates pass inspection	• reuse nitrate housing and packing materials as they are contaminated • allow reformatting agencies to house or ship nitrate and duplicate materials together to prevent contact and contamination

The *Conserve O Gram* series is published as a reference on collections management and curatorial issues. Mention of a product, a manufacturer, or a supplier by name in this publication does not constitute an endorsement of that product or supplier by the National Park Service. Sources named are not all inclusive. It is suggested that readers also seek alternative product and vendor information in order to assess the full range of available supplies and equipment.

The series is distributed to all NPS units and is available to non-NPS institutions and interested individuals on line at <http://www.cr.nps.gov/museum/publications/conserveogram/cons_toc.html>. For further information and guidance concerning any of the topics or procedures addressed in the series, contact NPS Museum Management Program, 1849 C Street NW (NC 230), Washington, DC 20240; (202) 343-8142.